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Porofensie Ya Kapa Botjhabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

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NOVEMBER 2025

MATHEMATICS P2/*WISKUNDE V2*
MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: 150

This marking guideline consists of 16 pages./
Hierdie nasienriglyn bestaan uit 16 *bladsye*.

QUESTION 1/*VRAAG 1*

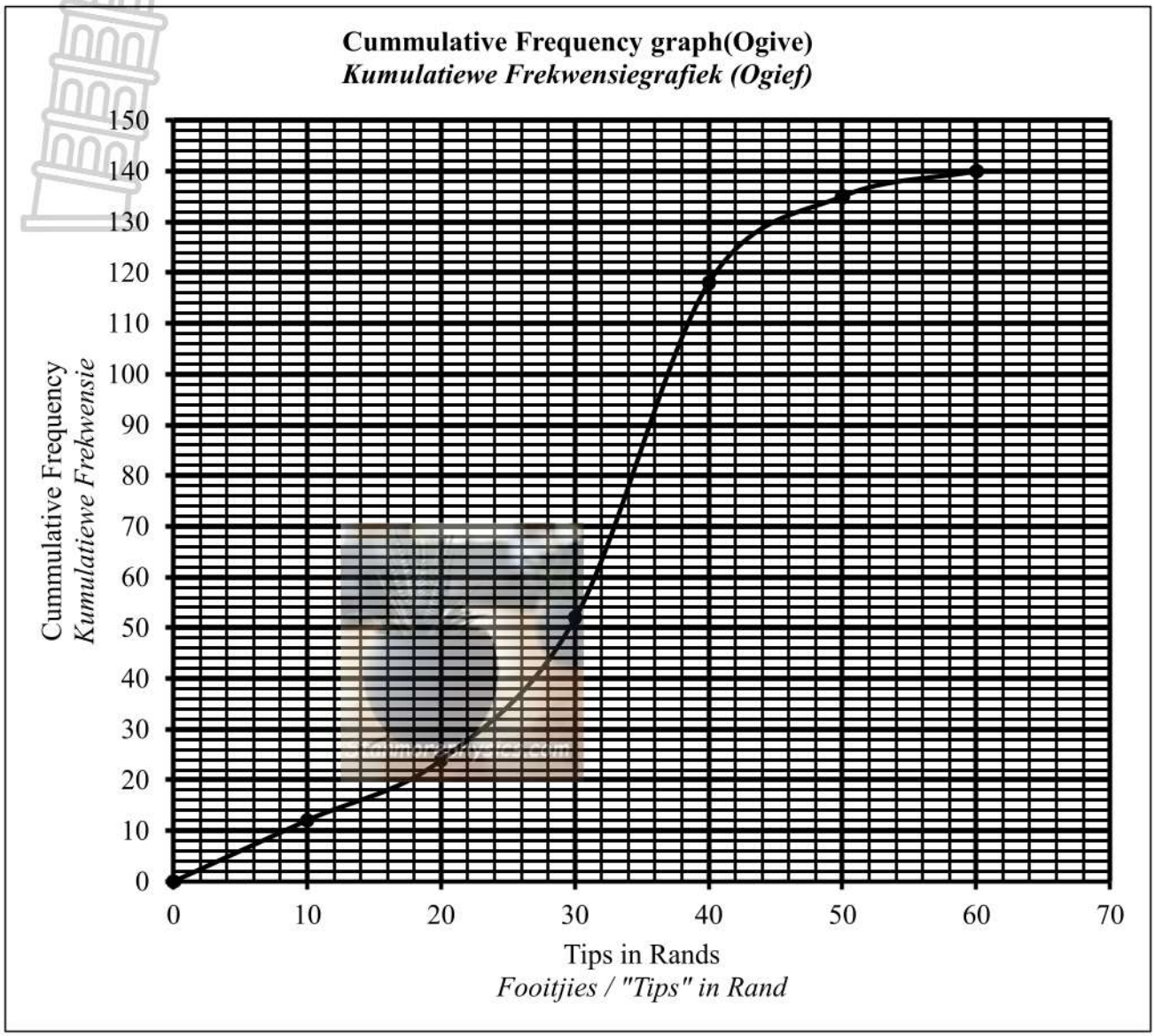
Data Set/*Datastel*:

Prizes/*Pryse*	3 600	4 500	5 400	6 200	x	12 300	15 800	y	43 800	87 500

1.1	$\frac{x+12300}{2}=9700$ $x=7100$	✓method/*metode* ✓ answer/*antwoord*	(2)
1.2	$\frac{y+186200}{10}=21770$ $y=31500$	✓correct equation *korrekte vergelyking* ✓ $y+186200$ ✓answer/*antwoord*	(3)
1.3	outlier/*uitskieter* = 87 500	✓ answer/*antwoord*	(1)
1.4	$\delta=25258{,}19$	✓✓ answer/*antwoord*	(2)
1.5	Mean will increase by R200 *Gemiddelde sal vermeerder met R200* Median will increase by R200 *Mediaan sal vermeerder met R200* Standard deviation will remain the same *Standaardafwyking sal dieselfde bly*	✓ increase by R200 *vermeerder met R200* ✓ increase by R200 *vermeerder met R200* ✓ remain the same *bly dieselfde*	(3)
			[11]

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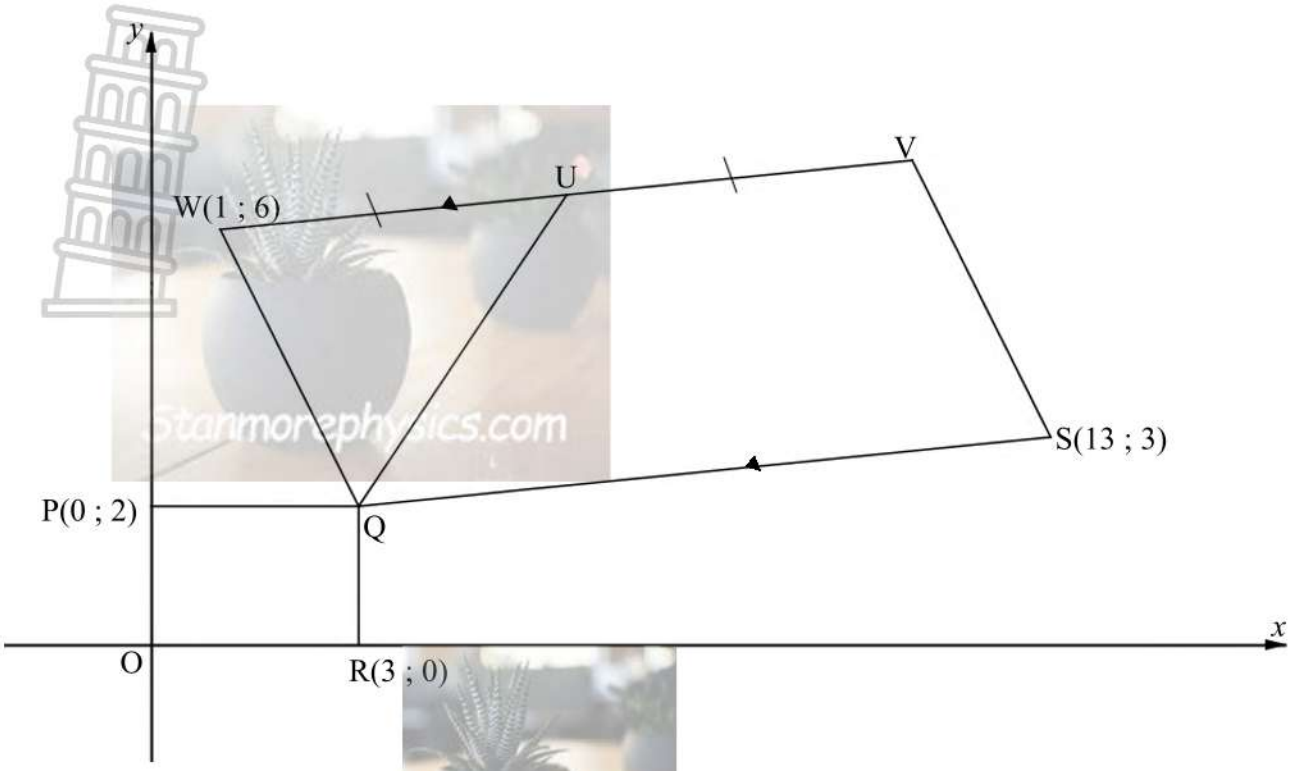
QUESTION 2/*VRAAG 2*



2.1	140 employees/*werknemers*	✓ answer/*antwoord*	(1)
2.2	$30 < x \leq 40$	✓ answer/*antwoord*	(1)
2.3	Reading from the graph / *lees vanaf grafiek* 32 employees/*werknemers*	✓ Reading/*lees* ✓ answer/*antwoord*	(2)
2.4	$118 - 24 = 94$	✓ $118 - 24$ ✓ answer/*antwoord*	(2)
2.5	25th percentile is at 35 = R25 *25ste persentiel is by 35 = R25* 75th percentile is at 105 = R38 *75ste persentiel is by 105 = R38*	✓ Q_1 ✓ Q_3	(2)
2.6	$IQR/IKW = Q_3 - Q_1 = R38 - R25$ $= R13$	✓ method/*metode* ✓ answer/*antwoord*	(2)
			[10]

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QUESTION 3/*VRAAG 3*



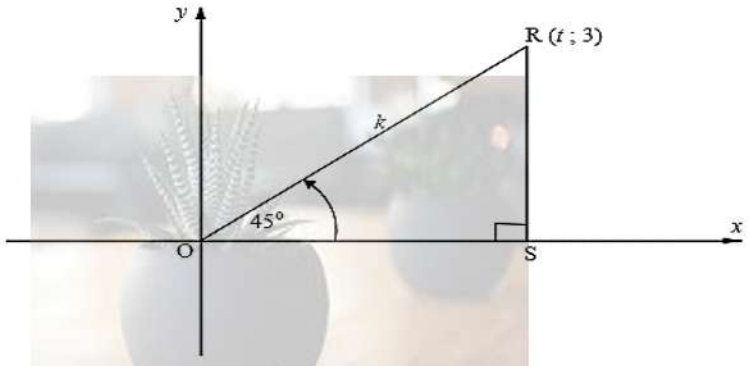
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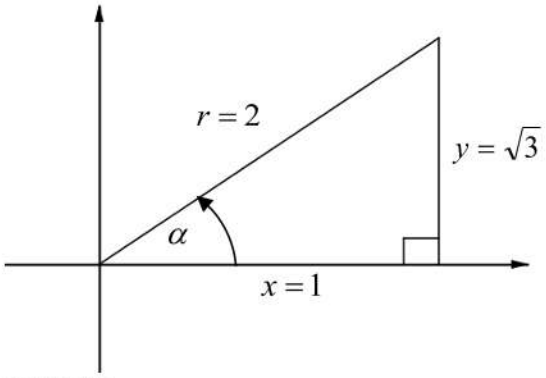
3.1	$Q(3;2)$	✓ answer/*antwoord*	(1)
3.2	$m_{QS} = \frac{3-2}{13-3}$ $= \frac{1}{10}$	✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(2)
3.3	$m_{VW} = m_{QS} = \frac{1}{10}$ $6 = \frac{1}{10}(1) + c$ $c = \frac{59}{10}$ $y = \frac{1}{10}x + \frac{59}{10}$ **OR/*OF*** $y - 6 = \frac{1}{10}(x-1)$ $y = \frac{1}{10}x + \frac{59}{10}$	✓ gradient of VW *gradiënt van* VW ✓ substitution/*vervanging* ✓ answer/*antwoord*	(3)
3.4	$\frac{3}{2}x - \frac{5}{2} = \frac{1}{10}x + \frac{59}{10}$ $\frac{7}{5}x = \frac{42}{5}$ $x_U = 6$ $y_U = \frac{3}{2}(6) - \frac{5}{2} = \frac{13}{2}$ $6 = \frac{1+x_V}{2}$; $\frac{13}{2} = \frac{6+y_V}{2}$ $11 = x_V$; $5 = y_V$	✓ equating equations *gelykstel van vergelykings* ✓ simplification *vereenvoudiging* ✓ *x*-value / *x-waarde* ✓ *y*-value / *y-waarde* ✓ method/*metode*	(5)

3.5	$M_{WS}\left(\frac{13+1}{2};\frac{3+6}{2}\right)$ $M_{WS}\left(7;\frac{9}{2}\right)$ $M_{QV}\left(\frac{11+3}{2};\frac{7+2}{2}\right)$ $M_{QV}\left(7;\frac{9}{2}\right)$ $\therefore$ WVSQ is a parm (Diag. bisect each other.) WVSQ *is 'n* $\|\|^{\mathbf{m}}$ (*Hoeklyne halveer mekaar*)	✓ correct substitution *korrekte vervanging* ✓ coordinates of midpt of WS *koördinate van midpt van WS* ✓ coordinates of midpt of QV *koördinate van midpt van QV* ✓ reason/*rede*	(4)
3.6	$\text{WV} = \sqrt{(1-11)^2+(6-7)^2}$ $= \sqrt{101}$	✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(2)
3.7	Let inclination of WV to be θ and QU be α *Laat inklinasie van WV,* θ *wees en van QU,* α *wees* $\tan\theta = m_{WV} = \frac{1}{10}$ $\theta = 5{,}71^0$ $\tan\alpha = m_{QU} = \frac{3}{2}$ $\alpha = 56{,}31^0$ $\therefore W\hat{U}Q = U\hat{Q}S = 50{,}6^0$ [alt ∠s, WV‖QS] [*verv.* ∠*e,* $WV \parallel QS$]	✓ $\tan\theta = m_{WV}$ ✓ size of θ / *grootte van* θ ✓ size of α / *grootte van* α ✓ answer/*antwoord*	(4)
3.8	$WU = \frac{\sqrt{101}}{2}$ $UQ = \sqrt{(6-3)^2+\left(\frac{13}{2}-2\right)^2} = \frac{3\sqrt{13}}{2}$ $A.\ of\ \Delta QUW = \frac{1}{2}\times\frac{3\sqrt{13}}{2}\times\frac{\sqrt{101}}{2}\times\sin(50{,}60^o)$ $= 10{,}50$ $\frac{\text{Area of PQRO}}{\text{Area of }\Delta\text{QUW}} = \frac{2\times3}{10.50}$ $= \frac{4}{7}$	✓ WU ✓ UQ ✓ correct subst. in to Area rule *korrekte verv. in oppervl. reël* ✓ A. of Δ. / *Oppervl. van* Δ ✓ correct subst. in A. of rect. *korrekte verv. in Opp. van regh* ✓ answer/*antwoord*	(6)
			[27]

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QUESTION 4 / *VRAAG 4*



4.1.1	$\tan 45^\circ = \frac{3}{t}$ $t = 3$	✓ correct trig ratio *korrekte trig. verhouding* ✓ *t*-value/*waarde*	(2)
4.1.2	$\sin 45^\circ = \frac{3}{k}$ **OR /*OF*** $\cos 45^\circ = \frac{t}{k} = \frac{3}{k}$ $k = 3\sqrt{2}$	✓ correct trig ratio *korrekte trig. verhouding* ✓ *k*-value/*waarde*	(2)
4.2.1	$8\cos^2\alpha - 2 = 0$ $\cos^2\alpha = \frac{1}{4}$ $\cos\alpha = \frac{1}{2}$	✓ simplification *vereenvoudiging* ✓ answer/*antwoord*	(2)
4.2.2	 **OR/*OF*** $y = \sqrt{2^2 - 1^2}$ *Pyth* $= \sqrt{3}$ $4\left[\tan^2\alpha - \cos^2\alpha\right] = 4\left[\left(\frac{\sqrt{3}}{1}\right)^2 - \left(\frac{1}{2}\right)^2\right]$ $= 11$	✓ diagram/*diagram* **OR/*OF*** ✓ $y = \sqrt{3}$ ✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(3)

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4.3.1	$\dfrac{\cos x.\tan x}{2\left[\sin x.\cos\left(x-90^0\right)+\cos x.\cos(-x)\right]}$ $=\dfrac{\cos x.\dfrac{\sin x}{\cos x}}{2\left[\sin x.(\sin x)+\cos x(\cos x)\right]}$ $=\dfrac{\sin x}{2\left[\sin^2 x+\cos^2 x\right]}$ $=\dfrac{\sin x}{2(1)}$ $=\dfrac{\sin x}{2}$	✓ $\dfrac{\sin x}{\cos x}$ ✓ $\sin x$ ✓ $\cos x$ ✓ simplification *vereenvoudiging* ✓ $\sin^2 x+\cos^2 x=1$ ✓ answer/*antwoord*	(6)
4.3.2	Period/*Periode* = 360^o	✓ answer/*antwoord*	(1)
4.4	$\dfrac{\cos 42^o \sin 48^o-\tan^2\left(-45^o\right)}{\cos^2 132^o}$ $=\dfrac{\cos 42^o.\cos 42^o-\left(-\tan 45^o\right)^2}{\left(\cos\left(90^o+42^o\right)\right)^2}$ $=\dfrac{\cos^2 42^o-(-1)^2}{\left(-\sin 42^o\right)^2}$ $=\dfrac{\cos^2 42^o-1}{\sin^2 42^o}$ $=\dfrac{1-\sin^2 42^o-1}{\sin^2 42^o}$ $=-1$	✓ $\sin 48^o=\cos 42^o$ ✓ $\left(-\tan 45^o\right)^2$ ✓ $(-\sin 4\,2)^2$ ✓ $\cos^2 42^o=1-\sin^2 42^o$ ✓answer/*antwoord*	(5)
4.5.1	LHS/LK = $\tan\beta-\sin\beta.\cos\beta$ $=\dfrac{\sin\beta}{\cos\beta}-\sin\beta.\cos\beta$ $=\dfrac{\sin\beta-\sin\beta\cos^2\beta}{\cos\beta}$ $=\dfrac{\sin\beta\left(1-\cos^2\beta\right)}{\cos\beta}$ $=\tan\beta.\sin^2\beta$ = RHS / *RK*	✓ $\dfrac{\sin\beta}{\cos\beta}$ ✓ simplification *vereenvoudiging* ✓ common factor *gemeenskaplike faktor*	(3)
4.5.2	$\beta=-90^o$ and / *en* $\beta=90^o$	✓ $\beta=-90^o$ ✓ $\beta=90^o$	(2)

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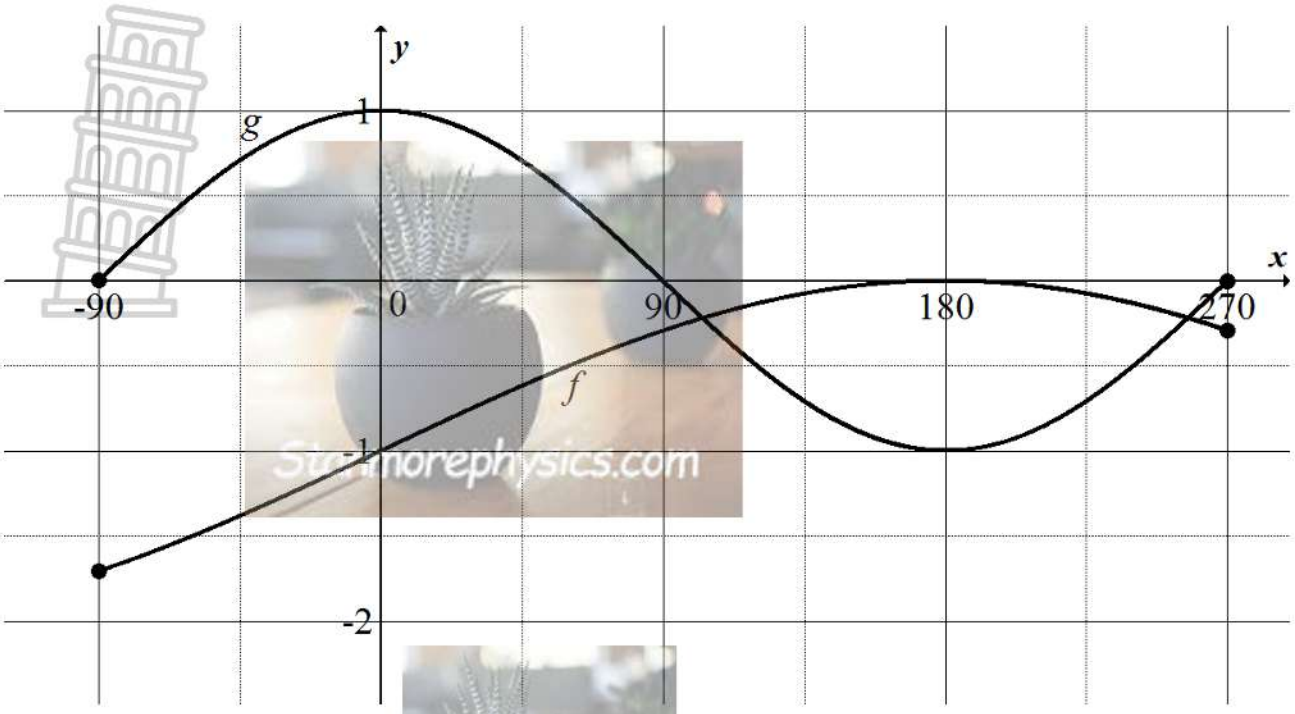
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4.6	$3\sin\theta = -2\cos^2\theta$ $2\left(1-\sin^2\theta\right)+3\sin\theta=0$ $2-2\sin^2\theta+3\sin\theta=0$ $2\sin^2\theta-3\sin\theta-2=0$ $\left(2\sin\theta+1\right)\left(\sin\theta-2\right)=0$ $\sin\theta=-\frac{1}{2}$ or / *of* $\sin\theta\neq 2$ $\theta=210^\circ+360.k \quad \theta=330^\circ+360.k, \quad k\in Z$	✓ $1-\sin^2\theta$ ✓ standard form *standaardvorm* ✓ factors/*faktore* ✓ both equations *beide vergelykings* ✓ $\theta=210^\circ+360.k$ ✓ $\theta=330^\circ+360.k,\ k\in Z$	(6)
			[32]



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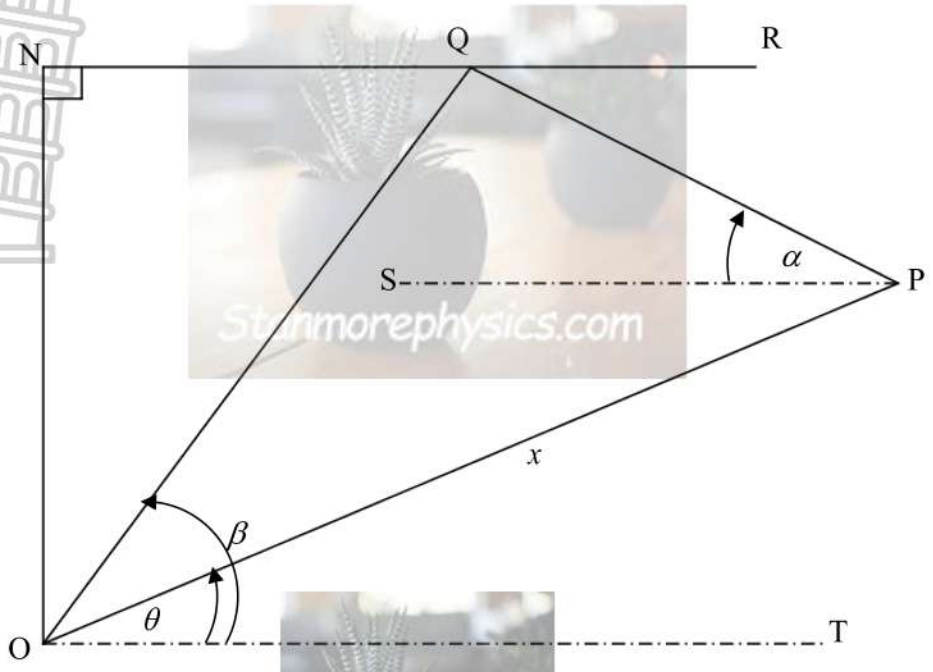
QUESTION 5/*VRAAG 5*



5.1	$a = 1$ $q = 0$	✓ value of *a / waarde van a* ✓ value of *q / waarde van q*	(2)
5.2	$y \in [-2;0]$ or / *of* $-2 \le y \le 0$	✓ correct critical value *korrekte kritieke waarde* ✓ correct notation *korrekte notasie*	(2)
5.3	Amplitude = 1	✓ correct answer *korrekte antwoord*	(1)
5.4	$x = 0^o$	✓ answer / *antwoord*	(1)
5.5	$-90^o \le x \le 90^o$	✓✓ correct answer *korrekte antwoord*	(2)
5.6	$h(x) = g(x + 90^o)$ $= \cos(x + 90^o)$ $= -\sin x$	✓ $\cos(x + 90^o)$ ✓ $-\sin x$	(2)
			[10]

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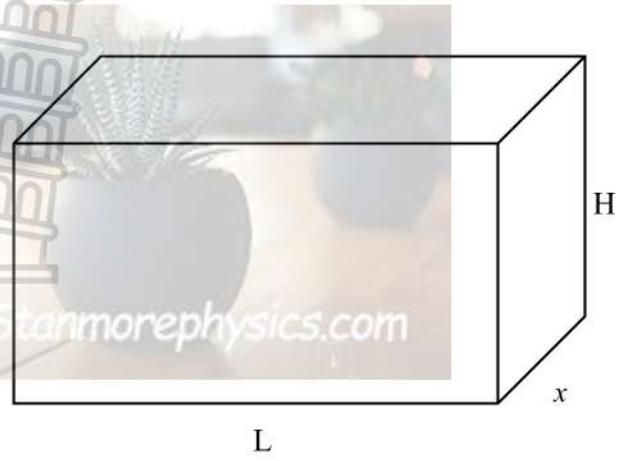
QUESTION 6/*VRAAG 6*



6.1	$S\hat{P}O = \theta + \alpha \quad [\text{alt. } \angle\text{s, verw.} \angle e : SP \parallel OT] \therefore$ $Q\hat{O}P = \beta - \theta$ $O\hat{Q}P = 180^o - (\theta + \alpha) - (\beta - \theta) [\angle sin \alpha \Delta / \angle ein \Delta]$ $= 180^o - (\beta + \alpha)$	✓ $S\hat{P}O = \theta + \alpha$ ✓ using sum of angles in Δ *gebruik van som van* $\angle e$ *in* Δ	(2)
6.2	$\frac{OQ}{\sin \hat{P}} = \frac{OP}{\sin O\hat{Q}R}$ $\frac{OQ}{\sin(\alpha + \theta)} = \frac{x}{\sin[180^o - (\beta + \alpha)]}$ $OQ = \frac{x.\sin(\alpha + \theta)}{\sin(\beta + \alpha)}$	✓ application of sine rule *toepassing van sinusreël* ✓ correct substitution *korrekte vervanging* ✓ reduction $\sin(\beta + \alpha)$ *reduksie* $\sin(\beta + \alpha)$	(3)
6.3	$\frac{5\sqrt{2}}{\sin 45^o} = \frac{x}{\sin 90^o}$ $x = 10$	✓ correct substitution *korrekte vervanging* ✓ answer/*antwoord*	(2)
			[7]

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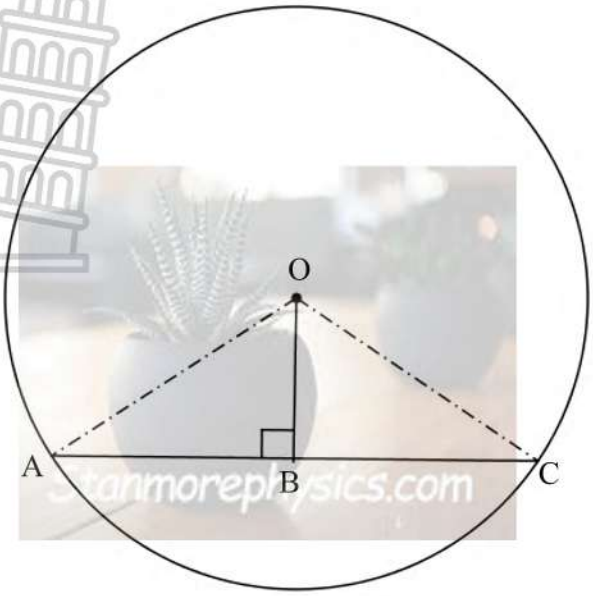
QUESTION 7/VRAAG 7



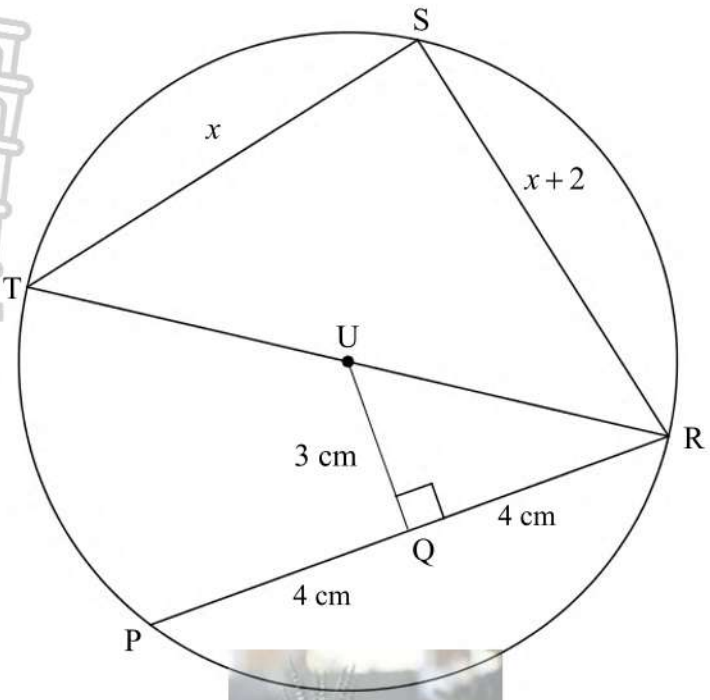
7.1	$L = 2x$ $H = 3 + x$	✓ $L = 2x$ ✓ $H = 3 + x$	(2)
7.2	$SA = 2(2x \times x) + 2(x(3+x)) + 2(2x(3+x))$ $= 4x^2 + 6x + 2x^2 + 12x + 4x^2$ $= 10x^2 + 18x$	✓ correct substitution / *korrekte vervanging* ✓ simplification / *vereenvoudiging* ✓ answer / *antwoord*	(3)
7.3	$10x^2 + 18x = 784$ $10x^2 + 18x - 784 = 0$ $5x^2 + 9x + 392 = 0$ $(5x + 49)(x - 8) = 0$ $x \neq \frac{40}{5}$ or $x = 8$	✓ correct substitution/ *korrekte vervanging* ✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ correct answer/korrekte *antwoord*	(4)
7.4	$V = (8)(2 \times 8)(3 + 8)$ $= 1408$	✓ correct substitution into volume / *korrekte vervanging in volume* ✓ answer/*antwoord*	(2)
			[11]

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QUESTION 8/VRAAG 8



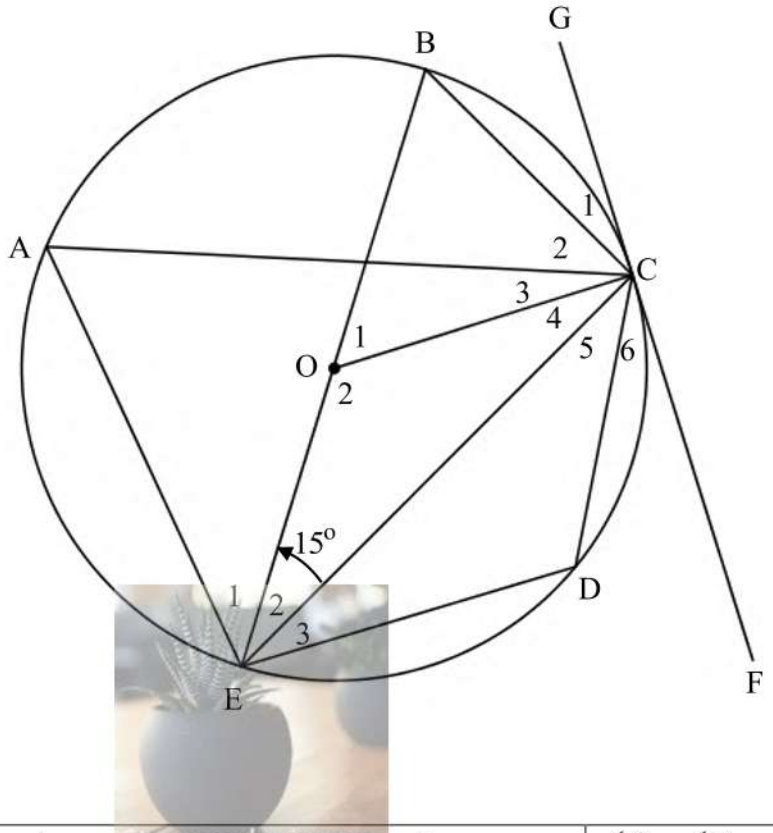
8.1	Constructions: Join OA and OC *Konstruksies: Verbind OA en OC* Proof in Δ AOB and Δ COB *Bewys in Δ AOB en Δ COB* 1. AO = CO [radii] / [*radiusse*] 2. $A\hat{B}C = C\hat{B}O = 90^o$ [∠s on a str. line] / [*∠e op reguitlyn*] 3. OB = OB [common] / [*gemeen*] $\therefore \Delta AOB \equiv \Delta COB$ [*RHS*] / [90° *Sk S*] $\therefore AB = BC$	✓ construction *konstruksie* ✓ S/R ✓ S/R ✓ S ✓ R	(5)

8.2			
8.2.1	$PQ = QR = 4\ cm$ [line from centre ⊥ to chord] [*lyn vanaf middelpunt ⊥ op koord*] $UR = \sqrt{4^2 + 3^2}$ [Pyth.theo]/ [*Stelling van Pythagoras*] $= 5$	✓ S ✓R ✓correct substitution/ *korrekte vervanging* ✓ answer/*antwoord*	(4)
8.2.2	$TR = 2(UR) = 10$ [diameter]/ [*middellyn*] $\hat{S} = 90^0$ [∠ in semi − circle]/[*∠ in semi − sirkel*] $10^2 = x^2 + (x+2)^2$ [*Pyth. theo*]/[*Stelling van Pythagoras*] $100 = x^2 + x^2 + 4x + 4$ $2x^2 + 4x - 96 = 0$ $x^2 + 2x - 48 = 0$ $(x-6)(x+8) = 0$ $x = 6$ *or / of* $x \neq -8$ $\therefore TS = 6$	✓ S ✓R ✓ correct substitution/ *korrekte vervanging* ✓ standard form / *standaardvorm* ✓ factors / *faktore* ✓ correct value of x / *korrekte waarde van x*	(6)
			[15]

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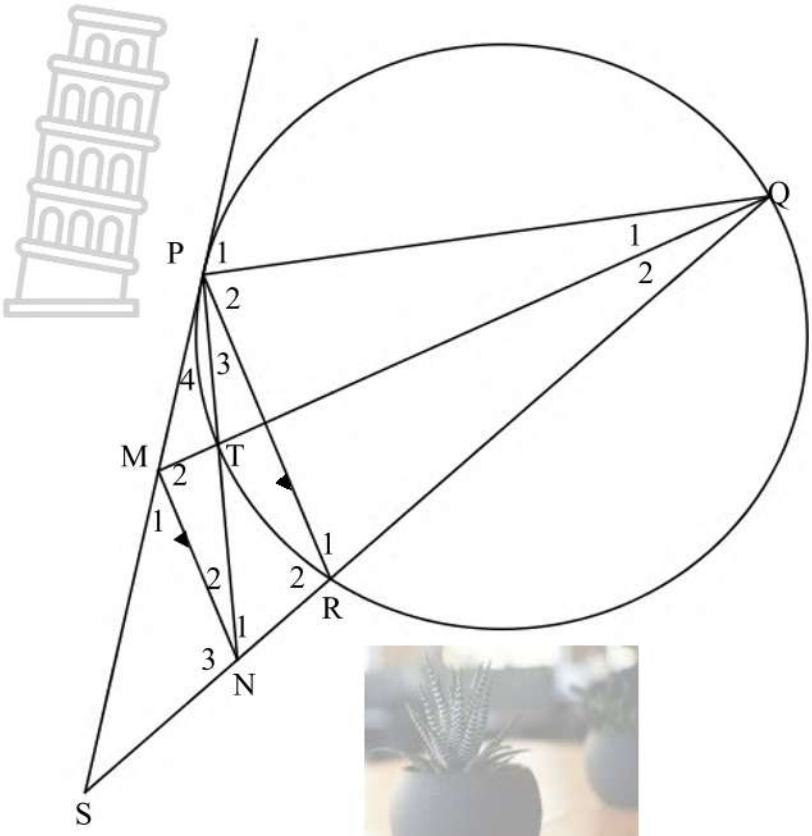
QUESTION 9 / *VRAAG 9*



9.1.1	$\hat{O}_1 = 30^o$	[∠ at centre = 2∠ at circumf.] [*Middelpunts ∠ = 2 x Omtreks ∠*]	✓ S ✓ R	(2)
9.1.2	$\hat{O}_2 = 150^o$ $\hat{A} = 75^o$	[∠s on a str.line]/[*∠e op reguitlyn*] [∠ at centre = 2∠ at circumf.] [*Middelpunts ∠ = 2 x Omtreks ∠*]	✓ S ✓ S/R	(2)
9.1.3	$\hat{D} = 105^o$	[opp. ∠s of a cyclic quad] [*Teenoorst. ∠e van koordevierhoek*]	✓ S ✓ R	(2)
9.1.4	$E\hat{C}F = 75^o$	[tan *chord theo.*] / [*raaklyn-koord stelling*]	✓ S ✓ R	(2)
9.1.5	$O\hat{C}G = 90^o$	[*rad* ⊥ tan] / [*radius* ⊥ *raaklyn*]	✓ S ✓ R	(2)

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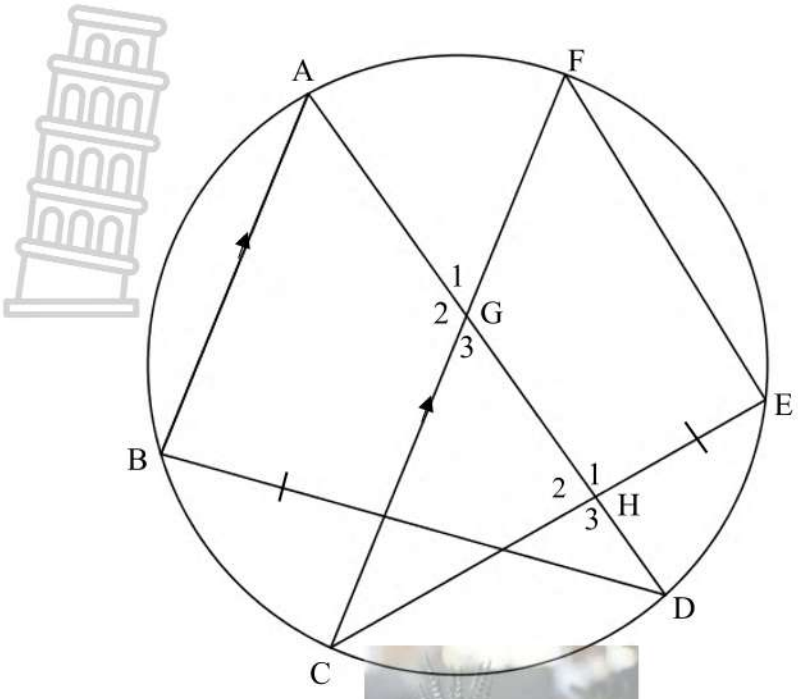
9.2



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9.2.1	$\hat{P}_1 = \hat{R}_1$ [tan chord theo] / [*raaklyn – koord stelling*] $\hat{P}_1 = M\hat{N}Q$ [corresp. ∠s,/ *ooreenk.∠e* : MN ∥ PR] $\hat{R}_1 = P\hat{T}Q$ [∠s same seg] / [*∠e in dies.segment*]	✓ S ✓R ✓S ✓R Any 2 angles with reasons / *Enige 2 hoeke met redes*	(4)
9.2.2	$S\hat{P}Q = \hat{Q}$ [tan chord theo] / [*raaklyn – koord stelling*] $S\hat{P}Q = \hat{M}_1$ [corresp. ∠s,/ *ooreenk. ∠e* : MN ∥ PR] $\therefore \hat{Q}_1 = \hat{M}_1$ $\therefore$ MNQP is a cyclic quad [conv.ext.∠ of a cyclic quad] *MNQP is 'n koordevh.* [*omgek.buite ∠ van koordevh*]	✓ S ✓R ✓S ✓R	(4)
9.2.3	$\hat{P}_3 = \hat{N}_2$ [alt. ∠s, MN ∥ PR] / [*verw.∠e* : MN ∥ PR] $\hat{N}_2 = \hat{Q}_1$ [∠s same seg] / [*∠e in dies.segment*] $\hat{Q}_1 = \hat{P}_4$ [tan chord theo] / [*raaklyn – koord stelling*] $\therefore \hat{P}_3 = \hat{P}_4$ PN bisects $S\hat{P}R$ / *PN halveer* $S\hat{P}R$	✓ S/R ✓S ✓R ✓S/R	(4)
			[22]

QUESTION 10/*VRAAG 10*



	$\hat{G}_3 = \hat{A}$	$[\text{corresp.} \angle\text{s} / \textit{ooreenk. } \angle e, GC \parallel AB]$	✓ S ✓R	
	$\hat{A} = \hat{F}$	$[\angle\text{s subt by} = \text{chords}]$ / $[\angle e \textit{ onderspan deur} = \textit{koorde}]$	✓ S ✓R	
	$\therefore \hat{G}_3 = \hat{F}$		✓ R	
	$\therefore AB \parallel FE$	$[\text{corresp. } \angle\text{s, } =]$ / $[\textit{ooreenkomstige } \angle e =]$		**[5]**

TOTAL/*TOTAAL*: 150

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